Claims:

1. A process for the production of an alkenyl carboxylate by reacting an alkene, a carboxylic acid and a molecular oxygen-containing gas in a reaction zone in the presence of a catalyst at an elevated reaction temperature, T, to produce an outlet stream from the reaction zone comprising alkenyl carboxylate and oxygen, and wherein in said process the catalyst is contacted with the alkene, at a partial pressure, P, optionally in the presence of the carboxylic acid, and the outlet stream comprises less than 2vol% oxygen, the improvement comprises reducing the partial pressure of the alkene and/or reducing the reaction temperature so as to suppress formation of benzene and/or suppress inhibition of the catalyst.

2. A process as claimed in claim 1, wherein the catalyst is contacted with alkene and carboxylic acid, and the outlet stream comprises less than 2 vol% oxygen.

3. A process as claimed in claim 1 or claim 2, wherein the outlet stream comprises 0 to 0.5 vol%, such as 0 to 0.2 vol% oxygen.

4. A process as claimed in any one of the preceding claims, wherein the alkenyl carboxylate product comprises less than 100 ppb benzene.

5. A process as claimed in any one of the preceding claims, wherein the partial pressure of alkene, P, such as ethylene, in the reaction zone is at least 0.3 bar or greater, such as at least 1 bar, for example, at least 2 bar.

6. A process as claimed in any one of the preceding claims, wherein the partial pressure of alkene in the reaction zone is reduced to at least 50% less than P.

7. A process as claimed in claim 6, wherein the partial pressure of alkene in the reaction zone is reduced by removing substantially all the alkene from the reaction zone.

8. A process as claimed in claim 7, wherein the alkene, optional carboxylic acid, and any oxygen present, are removed from the reaction zone by purging the reaction zone with an inert gas, preferably nitrogen.

9. A process as claimed in any one of the preceding claims, wherein the reaction is carried out at a temperature, T, of at least 100°C, preferably at least 140°C.

10. A process as claimed in any one of the preceding claims, wherein the reaction temperature is reduced to at least 20°C below T, preferably to at least 50°C below T.

11. A process as claimed in claim 10, wherein the reaction temperature is reduced to below 100°C, preferably to 50°C or lower.

12. A process as claimed in any one of the preceding claims, wherein the catalyst comprises a Group VIII metal, a promoter and optionally a co-promoter.

13. A process as claimed in any one of the preceding claims, wherein the catalyst is in contact with the alkene, and optionally the carboxylic acid, at low levels of molecular oxygen, for [>0 to 18] hours, preferably, [>0 to 12] hours, and more preferably, [>0 to 6] hours, prior to reducing the partial pressure of the alkene and/or reducing the reaction temperature.

14. A process as claimed in claim 13, wherein the catalyst is in contact with the alkene and the carboxylic acid, at low levels of molecular oxygen, for [>0 to 12] hours, preferably, [>0 to 6] hours, prior to reducing the partial pressure of the alkene and/or reducing the reaction temperature.

15. A process for the production of an alkenyl carboxylate in which an alkene, a carboxylic acid and a molecular oxygen-containing gas are contacted in a reaction zone at an elevated temperature, T, in the presence of a catalyst having a catalytic activity y, comprising a Group VIII metal, a promoter and an optional co-promoter, characterised in that where during the course of said process, the catalyst is contacted with the alkene, optionally in the presence of the carboxylic acid, and in the substantial absence of the molecular oxygen-containing gas, the period of contact, Z, between the catalyst and the alkene, and optional carboxylic acid is insufficient to reduce the catalytic activity by more than 10% of y.

16. A process according to claim 15, wherein where during the course of said process, the catalyst is contacted with the alkene, optionally in the presence of the carboxylic acid, in the substantial absence of the molecular oxygen-containing gas, the

partial pressure of the alkene is reduced and/or the temperature of the reaction zone is reduced.

17. A process according to claim 16, wherein the partial pressure of alkene in the reaction zone is reduced by purging the reaction zone with an inert gas, preferably nitrogen.

18. The process according to any one of claims 15 to 17, wherein the alkene is ethylene, the carboxylic acid is acetic acid, the alkenyl carboxylate produced is vinyl acetate and the period of contact, Z, of the catalyst with ethylene or ethylene and acetic acid is in the range [>0 to 18] hours, preferably, in the range, [>0 to 12] hours and more preferably, in the range [>0 to 6] hours.

19. The process according to claim 18 wherein the period of contact, Z, of the catalyst with ethylene and acetic acid is in the range [>0 to 12] hours, preferably, in the range [>0 to 6] hours.

20. A process according to any one of the preceding claims, wherein the process for the production of alkenyl carboxylate is carried out heterogeneously with the reactants being present in the gas phase or as a mixture of gas and liquid phases.

21. A process according to any one of the preceding claims, wherein the alkene is a C_2-C_4 alkene.

22. A process according to any one of the preceding claims, wherein the carboxylic acid is a C_2-C_4 carboxylic acid.

23. A process according to any one of the preceding claims, wherein the alkene is present in the feed to the reaction zone in a range between 30 and 85mol% of the total reaction composition, preferably at least 50mol% of the total reaction composition.

24. A process according to any one of the preceding claims, wherein the carboxylic acid is present in the feed to the reaction zone in a range between 2 and 30mol% of the total reaction composition, preferably 5 to 15mol%.

25. A process according to any one of the preceding claims, wherein the molecular oxygen-containing gas is molecular oxygen.

26. A process according to any one of the preceding claims, wherein the process for the production of alkenyl carboxylate is carried out as a fluid bed process.

27. A process according to claim 26 wherein the molecular oxygen-containing gas is present in the feed to the reaction zone in an amount in the range 3 to 20 mol% of the

total reaction composition.

28. A process according to any one of the preceding claims, wherein the alkene is ethylene and the carboxylic acid is acetic acid, such that the alkenyl carboxylate produced is vinyl acetate.

29. A process according to any one of the preceding claims wherein the catalyst for use in the process for the production of alkenyl carboxylate comprises palladium, a promoter selected from gold, copper, cerium and mixtures thereof and a co-promoter material selected from cadmium, barium, potassium, sodium, manganese, antimony, and/or lanthanum, present in the finished catalyst as a salt.

30. A process according to claim 29 wherein the catalyst is supported on a catalyst support selected from porous silica, alumina, silica/alumina, titania, silica/titania and zirconia.

31. A process according to any one of the preceding claims, wherein the temperature in the reaction zone, T, is in the range 100°C- 400°C and the pressure in the reaction zone is from atmospheric pressure up to 20 barg.